BUS.OP1 Production processes: job, batch and flow

AQA 8132 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions in the spaces provided. Show your working for any calculation: method marks are available even if your final answer is wrong. Puddlecombe Furniture Co, used throughout this pack, is a fictional business.

1 Which one of the following best describes job production?

- ☐ A) Making a single, unique product to meet one customer's specific order
- ☐ B) Making thousands of identical products continuously on a moving line
- ☐ C) Making a large batch of one product before switching the line over to make a different product
- ☐ D) Buying finished products from another business to resell

(Total for Question 1 is 1 mark)

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2 Which one of the following best describes flow production?

- ☐ A) Making a single, unique product to a customer's exact specification
- ☐ B) A continuous production process making a standardised product, often on a moving assembly line
- ☐ C) Producing goods only when a customer places an order, with no stock held at all
- ☐ D) Grouping orders from several customers together into one large one-off batch

(Total for Question 2 is 1 mark)

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3 State two features of batch production.

(Total for Question 3 is 2 marks)

4 Puddlecombe Furniture Co makes one-off, bespoke garden benches to each customer's exact design using job production.
Explain one benefit to Puddlecombe of using job production for these bespoke benches.

(Total for Question 4 is 3 marks)

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5 Puddlecombe also batch-produces standard picnic tables. Changing the line over for a new batch takes 3 hours, after which each table takes 0.5 hours to make.
Calculate the total time needed to produce a batch of 26 picnic tables. Show your working.

(Total for Question 5 is 2 marks)

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6 The workshop operates for 21 hours in total on the batch. Using the 3-hour changeover time and the 0.5-hour production time per table from question 5, calculate how many tables can be completed in this 21-hour shift. Show your working.

(Total for Question 6 is 2 marks)

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7 Explain one drawback to Puddlecombe of using batch production for its picnic tables.

(Total for Question 7 is 3 marks)

8 The 3-hour changeover for the picnic-table batch is carried out by a worker paid 20 pounds an hour.

(a) Calculate the changeover cost per table if the batch size is 20 tables. **(2)**

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(b) Calculate the changeover cost per table if the batch size is instead increased to 60 tables. **(2)**

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(Total for Question 8 is 4 marks)

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9 Each picnic table also has a variable cost (materials and direct labour) of 34 pounds. Using your answer to question 8a, calculate the total cost per table at a batch size of 20. Show your working.

(Total for Question 9 is 2 marks)

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10 Using your answer to question 8b, calculate the total cost per table at a batch size of 60. Show your working.

(Total for Question 10 is 2 marks)

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11 Using your answers to questions 9 and 10, explain why the cost per table falls as the batch size increases.

(Total for Question 11 is 3 marks)

12 Puddlecombe also runs one flow-production line making a simple wooden plant trough, with a cycle time of 4 minutes per trough.

(a) Calculate how many troughs the line can complete in one 480-minute (8-hour) shift. **(2)**

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(b) A final quality check rejects 5% of these troughs. Using your answer to part a, calculate how many troughs pass the quality check. **(2)**

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(Total for Question 12 is 4 marks)

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13 Explain one drawback to Puddlecombe of using flow production for the plant trough line.

(Total for Question 13 is 3 marks)

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14 For one bespoke bench (job production), the customer's design needs 22 hours of skilled labour at 19 pounds an hour, plus 132 pounds of materials. Puddlecombe sells the finished bench for 850 pounds.

(a) Calculate the total cost of making this bench. **(2)**

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(b) Using your answer to part a, calculate the profit made on this bench. **(2)**

.....

(Total for Question 14 is 4 marks)

15 Puddlecombe's picnic-table line currently uses batch production: at a batch size of 60, the cost per table is 35 pounds (question 10), but changeovers between batches waste time (question 7). Puddlecombe is considering converting this line to flow production instead, similar to its plant-trough line, which completes 120 units per 8-hour shift with a 5% rejection rate (question 12) but needed a large amount of capital to set up and cannot easily be changed to a different design (question 13).

Recommend whether Puddlecombe should convert its picnic-table line from batch to flow production. Justify your answer using the figures and points made earlier in this pack.

(Total for Question 15 is 9 marks)

Mark scheme · BUS.OP1 Production processes: job, batch and flow

Question 1

- **B1** A cao
- **Answer: A**

Question 2

- **B1** B cao
- **Answer: B**

Question 3

- **B1** one acceptable feature, e.g. a group (batch) of identical items is made together before the process moves on
- **B1** a second acceptable feature, e.g. the production line or machinery must be changed over (reset) between different batches
- **Answer: Any two, e.g. products are made in grouped batches; the line is changed over (reset) between batches.**

Question 4

- **B1** identifies a benefit, e.g. each bench can be made exactly to the individual customer's design and measurements
- **B1** develops the point, e.g. this flexibility lets Puddlecombe meet needs that a standard, mass-produced bench could not
- **B1** links clearly to an outcome, e.g. customers are willing to pay a higher price for this level of personalisation, increasing revenue per bench
- **Answer: Job production lets each bench be made exactly to the customer's own design, meeting needs a standard bench could not, so customers are willing to pay a higher price for it, increasing revenue per bench.**

Question 5

- **M1** 3 + 26 x 0.5 seen
- **A1** 16 hours cao
- **Answer: 16 hours.**

Question 6

- **M1** (21 - 3) / 0.5 seen
- **A1** 36 tables cao
- **Answer: 36 tables.**

Question 7

- **B1** identifies a drawback, e.g. changing the line over between batches (of picnic tables or a different product) takes time
- **B1** develops the point, e.g. no tables (or anything else) can be finished during this changeover time
- **B1** links clearly to an outcome, e.g. this changeover time is unproductive and increases the average cost of producing each table
- **Answer: Changing the line over between batches takes time during which nothing is being finished, so this unproductive changeover time increases the average cost of each table produced.**

Question 8

- (a) **M1** (3 x 20) / 20 seen
- (a) **A1** 3 pounds cao
- **(a) Answer: 3 pounds.**
- (b) **M1** (3 x 20) / 60 seen
- (b) **A1** 1 pound cao
- **(b) Answer: 1 pound.**

Question 9

- **M1** 34 + 3 seen (ft from question 8a)
- **A1** 37 pounds cao
- **Answer: 37 pounds.**

Question 10

- **M1** 34 + 1 seen (ft from question 8b)
- **A1** 35 pounds cao
- **Answer: 35 pounds.**

Question 11

- **B1** identifies the point, e.g. the 60 pound changeover cost is fixed for the whole batch, however many tables it contains
- **B1** develops the point, e.g. spreading this fixed cost over more tables (60 rather than 20) means less of it is added to each individual table, as shown by the fall from 3 pounds to 1 pound per table
- **B1** links clearly to an outcome, e.g. this is why the total cost per table falls from 37 pounds to 35 pounds as the batch size rises, a form of economies of scale
- **Answer: The 60 pound changeover cost is fixed for the whole batch, so spreading it over more tables (60 rather than 20) means less of it lands on each table, falling from 3 pounds to 1 pound per table, which is why total cost per table falls from 37 pounds to 35 pounds.**

Question 12

- (a) **M1** 480 / 4 seen
- (a) **A1** 120 troughs cao
- **(a) Answer: 120 troughs.**
- (b) **M1** 120 x 0.95 seen (ft from part a)
- (b) **A1** 114 troughs cao
- **(b) Answer: 114 troughs.**

Question 13

- **B1** identifies a drawback, e.g. setting up a continuous production line requires a large amount of capital to buy the equipment
- **B1** develops the point, e.g. the line is designed to make one standardised product, so it is difficult and costly to change if demand for that product falls or the design needs updating
- **B1** links clearly to an outcome, e.g. this makes flow production a risky, inflexible choice unless Puddlecombe is confident of steady, high demand for the trough
- **Answer: Flow production needs a large amount of capital to set up the continuous line, which is designed for one standardised product and is costly to change, making it a risky, inflexible choice unless demand stays steady and high.**

Question 14

- (a) **M1** 22 x 19 + 132 seen
- (a) **A1** 550 pounds cao
- **(a) Answer: 550 pounds.**
- (b) **M1** 850 - 550 seen (ft from part a)
- (b) **A1** 300 pounds cao
- **(b) Answer: 300 pounds.**

Question 15

- **Level 1** (1-3): Makes simple, undeveloped comments about the production-method decision, with little or no use of the pack's figures and no clear recommendation.
- **Level 2** (4-6): Gives a developed argument for or against converting to flow production, using some of the pack's figures, but does not fully weigh both sides or reach a clearly justified recommendation.
- **Level 3** (7-9): Weighs the evidence for and against converting to flow production, using the batch-cost, flow-output and rejection-rate figures from this pack, and reaches a justified recommendation supported by that analysis.
- **Indicative content:**
  - For converting to flow: batch production still loses time to changeovers between batches (question 7), and the cost per table falls only as far as 35 pounds even at a larger 60-table batch (question 10); a continuous flow line removes changeover time altogether.
  - For converting to flow: the trough line already shows flow production can achieve high, steady output (120 units per 8-hour shift, question 12a), which could suit picnic tables if demand is high and stable enough to keep the line running.
  - Against converting to flow: setting up a flow line needs a large amount of capital (question 13), and the picnic-table design would then be difficult and costly to change if customer tastes or Puddlecombe's product range needs updating.
  - Against converting to flow: the flow line's 5% rejection rate (question 12b) shows quality issues do occur, and unlike batch production, an inflexible flow line cannot easily be paused or resized if demand for picnic tables falls.
  - Judgement: since picnic tables are a standard, repeat-order product (unlike the fully bespoke benches), a reasonable recommendation is to convert to flow production only if Puddlecombe is confident that demand will stay high and steady enough to justify the capital cost and inflexibility involved, otherwise batch production at the larger 60-table batch size remains the safer choice.